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Attenuation of the Early Gamma Oscillations During the Sensory-Evoked Response in the Neonatal Rat Barrel Cortex

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Abstract

© 2016, Springer Science+Business Media New York.Whisker stimulation evokes bursts of activity organized in gamma frequency band oscillations in the corresponding barrel of the neonatal rat barrel cortex, so called early gamma oscillations (EGOs). Here, we show that EGO properties dynamically change during the sensory-evoked response, including (i) a progressive decrease in the EGOs' dominant frequency, (ii) a decrease in the gamma trough amplitudes, and (iii) a reduction in the multiple unit firings in association with each consecutive EGOs' trough. Circular statistics of the multiple unit activity in relation to EGOs revealed a progressive decrease in the Rayleigh vector amplitude yet without any significant change in its angle. Thus, EGO properties and synchronization of the cortical barrel units dynamically change through the time course of the sensory-evoked response in the neonatal rat barrel cortex.

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Keywords

Barrel cortex, Early gamma oscillation, Electroencephalography, Neonate, Rat, Whisker